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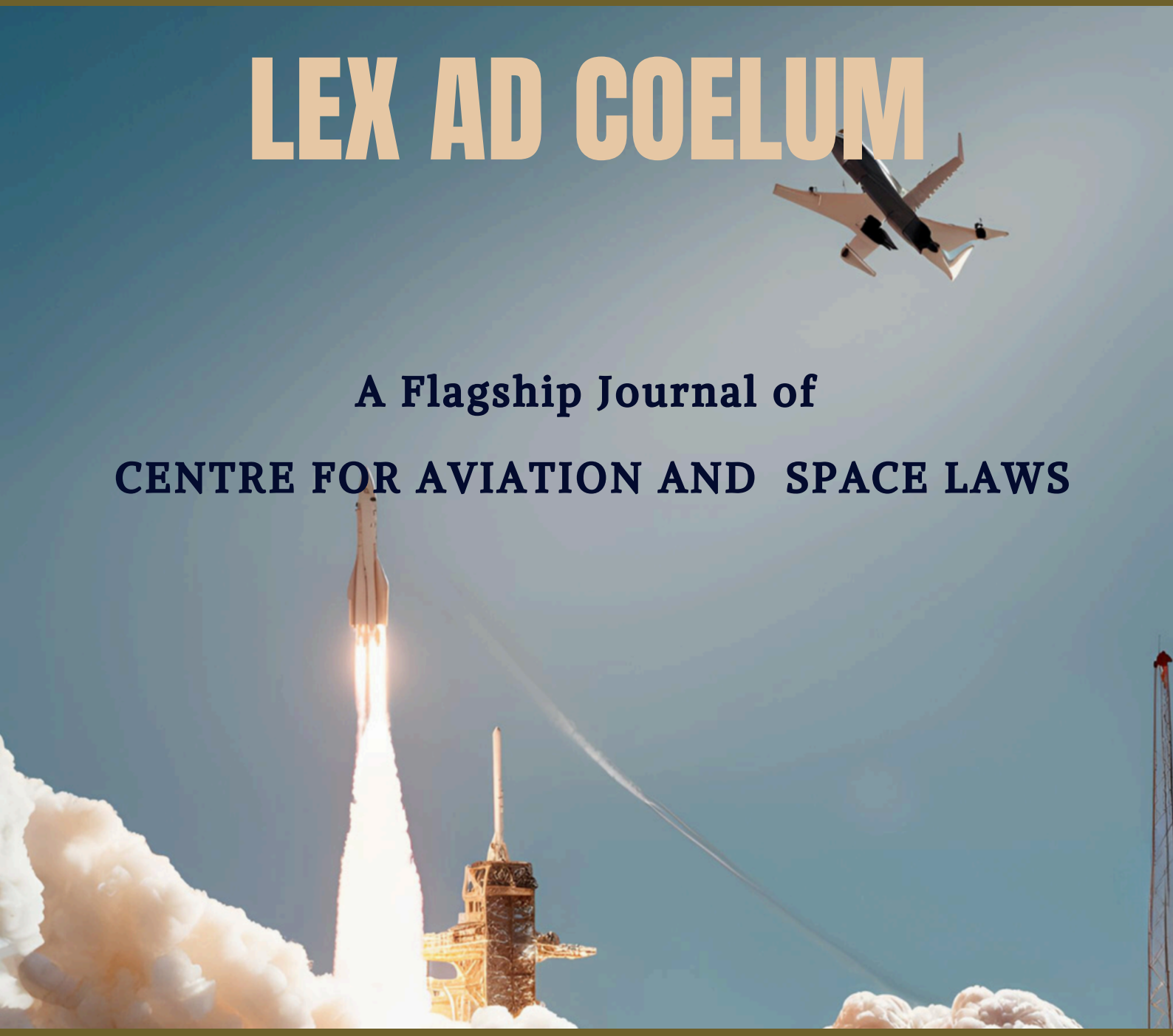

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AIRWORTHINESS IN AVIATION: LESSONS FOR LEGAL AND ORGANISATIONAL ISSUES

Prof (Dr.) G. S. Sachdeva[*]

Abstract

The safety of aircraft, to a very large extent, depends on the aircrew's fitness and the airworthiness of the aircraft for flying operations. The other risks of pilot error, ATC failure, or mid-air collisions are much lower in comparison. Despite the well-known fundamentals, most commercial airlines prioritise the mandate of operations over technical requests. No doubt, punctual operation of an airline is a brand asset in the competitive aviation market, but the hazards of constant technical hurry can be grievous and regrettable. This happened to Air India flight AI-171 on 12 June 2025, a lesson that must visit the heads of other airline chiefs also. Every organisational component of the airline corporate structure has its importance and deserves recognition of its due contribution, while over-rating or over-emphasising one vertical alone, to the detriment or underrating of others, can be grievous. This being the focal point, the author makes an attempt to outline the significance of the airworthiness of the aircraft as a non-derogable factor in civil aviation.

Keywords: Aircraft Accident Investigation Bureau (AAIB) - Air India - Boeing 787 - Director General of Civil Aviation (DGCA) - Preliminary Report - Serviceability Bulletin

Facts of the Accident

Air India flight, AI-171, scheduled from Ahmedabad to London (Gatwick Airport) on 12 June 2025 was a Boeing Dreamliner B787 aircraft carrying 242 persons comprising the passengers and the crew members. It took-off from the runway normally and recorded the maximum speed of 160 knots three seconds after take-off but could not continuously gain height in the proper functioning of the lift and ascent as per the operation of the requisite controls and sensors. Thus, shortly after take-off, within seconds, it started losing height and crashed 32 seconds after take-off just a few kilometres outside the airport boundary into a building block of a nearby hospital. The death toll was rather heavy.

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Some visual accounts and amateur videos have revealed details about the accident. These confirm that the flight took-off from the runway and instead of ascending further, it seemed to lose height till it crashed. On impact, the aircraft, fully loaded with fuel for a long journey, exploded into a ball of fire, engulfing and damaging the impacted and surrounding buildings. The aircraft was piloted by Sumit Sabharwal, a captain with an experience of over 15000 flying hours and having logged over 8000 hours on the type, as well as having experience as a trainer. In this tragic accident, 241 passengers died, with a miraculous escape of one with injuries. Apart from passengers, this accident caused 19 deaths and injuries to 67 persons on the ground.

Preliminary Accident Investigation Report

The preliminary investigation report regarding the accident of Air India flight AI-171 relating to the crash of Boeing 787, Dreamliner, was made public in July 2025. The two Enhanced Airborne Flight Recorders (EAFR), one in the cockpit and the other in the tail section, were recovered in badly damaged and burnt condition. A limited portion of the digital data has been decoded to find the cockpit conversation of the captain asking, "who shut the fuel release valves?" and the co-pilot confirming, "I didn't do it." The obvious reason seems to be the absence of fuel supply to both engines and the consequent May Day message. Thus, it has established the apparent cause of the accident as fuel starvation due to the fuel control switches for both engines being closed.

Fuel control switches are installed on the central console of the cockpit and need a two-step movement to avoid unintended change of position. These also have a locking feature and would not operate on an accidental touch or during turbulence. But the investigation has not been able to find out when or how it happened, who did it, why was it done? Or is it that it happened after take-off or whether it occurred on its own despite non-return spring locks. However, the inquiry has strived to make one point clear that the impugned process of shut-down of fuel surely required positive human action, advertant or inadvertent, implying thereby that it could have been pilot error.

The Preliminary Report released appears more cursory in nature and preliminary in content than thorough or investigative in approach. It seems to defend the integrity of the hardware with a focus on the fuel control switches, rather than finding vital clues to the cause of the accident, which remain repressed or shrouded in mystery.

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The report also did not evaluate other credible, alternative plausibility centred on hardware defect or engine failure, software bug or systemic malfunction. In case fuel switches were already off at pre-flight, then fuel deficiency should have become apparent on taxying, power-check on the runway or during take-off. Experts suggest that there could be a likelihood that the fuel supply was shut by the Full Authority Engine Control (FADEC) system, bypassing the cockpit switches, possibly due to digital or electrical failure.

The report, however, throws speculative hints about human error and ancillary causation with no proof or valid justification. On the contrary, the report notes a one-second interval between the stoppage of fuel supply to the two engines, which activity manually, is virtually impossible for humanly action by a pilot. Thus, the obliquely hinted theory of intentional or deliberate change of position of the switches seems diversionary and predatory. Hence, the line of approach by the Aircraft Accident Investigation Bureau (AAIB) does not appear consistent, substantive or transparent; it rather seems motivated or 'purposed.'

Captain Dilip Desmond, in his detailed analysis of flight trajectory and sequence of occurrences relating to the crash, has found glaring inconsistencies and has rejected the possibility of fuel valves being manually deactivated. He argues, "if neither person in the cockpit actuated them, how could they have been cut off? Is it false denial or suicidal pilot action? Third hidden person? Technical failure or software failure causing the switches to be placed in cutoff without human action despite their engineering to be human fault-proof?" After eliminating various possibilities, he has logically opined by suspecting the devil in the FADEC system.

The airlines pilots' fraternity (Airlines Pilots Association of India) has challenged the premature and unsubstantiated conclusion of the investigation, insinuating pilots, and have threatened to sue the United States media for such infantile and conjectural reporting without a plausible basis or unassailable proof. Indian media has also rejected this narrative while criticising the weak findings of the accident report. Ram Mohan Naidu, Minister for Aviation, has also criticised and repudiated such premature comments by the foreign media and has appreciated the job done by AAIB, particularly in decoding the black box.

Apart from objections raised on transparency and intent of the preliminary report, it leaves more questions unanswered than it answers. For example, the report has

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alluded to the fuel swich disengagement, but has not highlighted the fact that the switches fitted were from the same series as for Boeing 737s, some of which had been found to be faulty by the United States aviation regulator seven years ago. It is deemed equally important to draw attention to the Serviceability Bulletin of 2018 relating to the fuel control switch issued after defect reports came in from the Boeing operators. The Bulletin had indicated "a potential equipment malfunction, but deemed it was not an unsafe case." Based on the report, the Federal Aviation Administration had also issued a directive in 2018 to inspect the locking feature on the fuel control switch. But since it was not a mandatory bulletin, Air India did not comply with this to carry out the inspection. Possibly, a detailed investigation report of the instant accident will, in due course, bring out more facts and findings about the hardware failure, software lapse, critical fault-activity and the real activator of the cause of the accident.

Importance of Airworthiness of Aircraft

Notwithstanding the conclusion of the Preliminary Inquiry regarding the fault or causation of the tragic accident, it is deemed pertinent to flag the importance of the airworthiness of the flying machines for all operations and exigencies. Aircraft serviceability in all aspects should be a prime consideration and enjoined as a sacred trust for the utmost safety of the passengers and the crew. Without drawing a conclusion, unconfirmed reports and leaked rumours have pointed towards a dominant role of flying operations in Air India and their obsession with on-time status achievement rather than ensuring the technical serviceability and maintenance integrity of the flying machines. Air India has a fleet of 33 Dreamliner aircraft. Veracity apart, even an iota of truth in such a revelation suggests a mental fixation derogatory to and equally inimical to commercial air operations.

The correct approach and the right mindset have now dawned on the government, and it is initiating and taking corrective measures. A positive step towards flight safety and ensuring airworthiness of the fleet is indicated by a media report that Minister Ram Mohan Naidu, Aviation Secretary Samir Kumar Sinha and the Director General of Civil Aviation (DGCA) Chief Faiz Ahmed Kidwai met Air India Chief Chandrasekaran on 25 July 2025. The authorities have advised the airline to "end backseat driving" and release departmental autonomy to the key departments like safety, training, maintenance, engineering and integrated operations control

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centre (IOCC). The initiated 'newbies' may be deferred till the airline fully stabilises since its take-over. Hence, the composite emphasis is clearly on airworthiness of the fleet and fitness of the crew, at all costs, without undue interference or by over-ruling mandates.

Domination of Operations over Technical Maintenance

Newspaper reports and leaked rumours, unconfirmed, point towards a syndrome of Operations domination and suppression of maintenance stakes with an obsession to achieve and sustain punctuality of flight services in a competitive market. Although the aim is laudable, it seems to have been staked at a high cost and on weak foundations. Maintenance of aircraft at all stations: pre-flight checks, periodical servicing and life-based overhauls are all important and deserve 6-sigma quality assurance.

All these sequential events are planned and averaged for time slots, yet in an isolated instance of a detection of a persistent snag or a glitch in aircraft, aeroengine or rotables may take longer than the scheduled time in fault-isolation, servicing, repair, replacement or testing. This need not be rushed in haste to enable the aircraft to resume, continue operation or rejoin the operational fleet by the due date. Proper and confirmed serviceability should be ensured. Anyway, spare capacity and cushions in operations can always be worked out without disturbing the compliance of maintenance mandates and technical standards.

Previous Snags with Dreamliner/Boeing Fleets

It is a well-known fact that the Boeing 787 fleet has been plagued by different snags right from the beginning of its operational life in 2011. The most memorable one relates to the lithium batteries and a couple of electrical fires due to an alleged manufacturing defect/component selection. Despite denials by the manufacturers, the problem was technically rectified. Even manufacturing problems due to structural and body defects were reported, which caused multiple groundings and salutary checks worldwide. In fact, an insider of the Boeing company, John Barnett, who worked as quality manager for 30 years, had revealed that workers, under pressure, have been fitting sub-standard parts, even ones picked from the dustbins. This seems an alarming confession. He further claimed that he himself "had uncovered serious problems with oxygen systems."

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Another whistleblower, Sam Salehpour, a working engineer of Boeing, expressed safety concerns in 2024 and cautioned that "Boeing should ground every 787 Dreamliner jet worldwide." The voiced concern led to certain checks and an investigation by the Federal Aviation Administration, which is currently underway. It appears that the ordered checks were not without basis because Boeing fleet operations were not unblemished in the past. Even in the last week of July 2025, a few incidents have happened to the Boeing fleets operated by different users.

It will be pertinent to mention an earlier incident of twin-engine failure, though not exactly comparable yet with a fair similarity of fuel control switches going dough without intentional shut-off. In January 2019, a Boeing 787 suffered simultaneous dual engine failure on landing in Osaka. Providentially, it was on landing, and pilots deployed thrust reversers after touchdown to reduce the speed of the aircraft. Nevertheless, both engines shut down, and the plane had to be towed to the terminal. It needs to be researched if the same series of switches was the cause of the accident that happened at Ahmedabad.

The other Boeing fleets have been equally afflicted. On 23 July 2025, an IndiGo flight from Ahmedabad reported engine fire before take-off. Fortunately, all passengers were safely evacuated. On 25 July 2025, a Boeing plane crashed into an Italian highway with a fiery explosion. It killed two passengers. On 27 July 2025, American Airlines' Boeing 737 MAX on flight AA-302 aborted take-off after gear malfunction at the Denver International Airport. The aircraft caught fire and was engulfed in smoke, causing panic. The passengers and the crew were evacuated by sliding down to escape from the plane.

Reported Defaults of Air India and its Subsidiaries

Two flight attendants reported a snag in the functioning of the door of a Boeing 787 Dreamliner that occurred to AI-129 flight on 14 May 2024 at Heathrow Airport. Allegedly, the Dreamliner's door malfunctioned, in that even when the slide raft was deployed, the door opened in "manual mode" while it should have opened in armed mode. The crew reported the snag as a technical problem with the door. Rather than rectification, the cabin crew was requested and then pressurised to withdraw the snag. When the cabin crew refused to change their reporting, they were dismissed in two days.

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Within 38 hours of the Ahmedabad crash, Air India Delhi-Vienna flight AI-187, "wide-bodied aircraft had a mid-air safety scare, involving a stall warning and a double 'don't sink caution' from the Ground Proximity Warning System after the Boeing 777 suffered an altitude loss of 900 feet during climb." It was a close shave, but the flight was stabilised. It was "a precarious situation, reflected in a 'stick shaker' warning that refers to the control column on the flight deck shaking and making noise to indicate something isn't right. Luckily, for flyers, AI-187 had no hiccups and landed safely in Vienna," The report was communicated to DGCA, and the pilots were off-rostered pending investigation.

DGCA, the statutory aviation regulator and oversight institution in India, recently made public a report of safety audit of compliances and defaults during the last one year covering eight major airlines. This was conducted as per a regular annual surveillance plan under the safety oversight programme to enhance safety standards. It found a total of 263 lapses, of which 51 pertained to Air India and 25 to Air India Express, which seems rather high. Again, of the total defaults, 19 lapses have been of Level-one or significant failures, and all these have been detected from Air India, Air India Express and the erstwhile Vistara. All other lapses are at Level-two and are in the nature of non-mandatory compliances. Nevertheless, completions and compliances are time-bound and have to be confirmed to the authorities. Incidentally, as per another report, "DGCA has served nine show-cause notices to AI for five safety violations in the last six months." Continued and persistent defaults do not reflect well on the harmonious culture within the corporation.

Comparably, IndiGo has shown a much better record among Indian airlines. Only 23 Level-two lapses were detected, while no Level-one default was found. This looks like a promising safety record, and it should be viewed in relation to the extensive and expansive scale of its operations. IndiGo has the largest fleet in India, the reach of destinations and the total flying hours logged. Thus, its performance matches the pattern of major international carriers considering their diversity and intensity of inputs. The credibility of such audits stems from the fact that these are based on the International Civil Aviation Organisation (ICAO) requirements and the pick of global best practices that enhance flight safety and ensure continuous improvement across all facets of airline operations.

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Lessons for Legal and Organisational Issues

The crux of all this is that the airworthiness of aircraft, though sacrosanct and a sacred trust of the air technicians, has been compromised somewhere and at some stage for different reasons or different purposes. In the ethics of aircraft maintenance, short-cuts are shunned and deemed a taboo because serviceability and safety of the aircraft, *abundanti cautela,* reign as a supreme motto, and no supervisory staff should become accomplice to any incorrect practice, improper technical concession or unauthorised corrective. The methodology or culture of compromises, popularly termed "*jugaad*"[1], sooner or later, brings grief to the perpetrator and to many other innocents. Regrets then will be insufficient, and the sin would be unpardonable. Hence, this message must resonate in the aviation world.

The duties of DGCA are legislated with regard to airline operations, aircraft maintenance, air traffic management, accident investigation etc., and it can rightfully demand proper oversight and strict compliance. Deficiencies in this task and derelictions by the staff may turn tragic. Technical alerts should not only be issued but also seen to be complied with for the safety of passengers, on-board crew, the aircraft and those on the ground. This calls for cooperation from all the duty-bound personnel and other stakeholders, which should be voluntarily forthcoming in their own interest to avoid crew attrition, accidental loss of aircraft, reputational embarrassment and liability quanta for deaths on-board and on the ground.

Air India has, therefore, been correctly advised by the regulatory authorities to defer the competitive commercial race, temporarily sacrifice growth and merely rationalise expansion so as to concentrate on the ethics of safety considerations, to stabilise maintenance practices and foster a culture of airworthiness within the organisation. A balanced organisation with respective priorities and with no bulldozing engenders harmonious working relations that are essential for corporate growth. This message must permeate to the right verticals, right echelons, in right measure for right appreciation.

Lastly, it will not be impertinent to flag a conflict of interest in the duties of the DGCA in that it is the regulator of aviation operations, inspector of technical standards, responsible for oversight of safety compliances and, at the same time, an arbiter when conducting inquiries into accidents. This assemblage of competing and contrary duties within one organisation and under the same apex-head often leads

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to proverbial conflicts, suppression of uncomfortable observations or ignoring lapses that may impinge on each other to share or shirk the blame.

No wonder, uncomfortable questions have been raised on the investigative quality, neutrality and objectivity of the accident investigation regarding AI-171 flight. Such doubts are natural and understandable due to the intrinsic and incompatible composition of the DGCA packed with strange bedfellows. Further, almost from the constitution of DGCA, its head has been a non-specialist or a political appointee, except for a couple of incumbents; whereas professionalism is the hallmark of modern institutions for organisational harmony, balanced management, better performance and execution of the institutional mandate.

Notes and References:

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[1] "*Jugaad*" is typically Indian engineering practice wherein a snag in a machine or equipment is temporarily adjusted or fixed, not abiding by the standard technical procedure or accepted maintenance practice but by an indigenous, non-conventional method. The term '*Jugaad*' finds place in Oxford Contemporary Dictionary.

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ANALYSING THE PARADOX OF AUTHORISATION RESTRICTIONS UNDER NGP AND FDI LIBERALISATION IN INDIA'S SPACE SECTOR

Parineeta Singh[*]

Abstract

The Norms, Guidelines and Procedures for Implementation of Indian Space Policy-2023 in respect of Authorization of Space Activities (NGP) provides a much-needed outline for the operation of Non-Government Entities (NGEs) in the space sector. One key objective highlighted through NGP is the focus on keeping the 'management and control' in the hands of Indian players. One such example could be the requirement of 'fresh authorisation' on account of post-facto notification whenever there is a transfer of control to a non-Indian entity, including any significant change in shareholding patterns or equivalent changes in partnership or trust. It prioritises national interest while ensuring transparency and accountability as well. Viewing NGP cumulatively with the liberalised Foreign Direct Investment (FDI) policies indeed reflects India's intention to strengthen its global reach in the space sector. However, balancing FDI liberalisation with a restricted authorisation policy might challenge the successful execution of the Indian Space Policy 2023. On the one hand, India is opening doors to foreign investors, which is likely to impact the decision-making of the NGEs. On the other hand, limiting the authorisation to Indian entities to ensure that the management and control lie in the hands of domestic players does not seem to align with the liberalised FDI initiative. The absence of a concrete regulatory framework with legal backing will also pose a challenge in the application of these guidelines, as it will be difficult to engender the confidence of foreign investors.

Keywords: Authorisation Guidelines - Foreign Direct Investment (FDI) - Indian Space Policy (ISP) - Management and control - National security

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Introduction

India's developing course in the global space economy has reached a transformational stage, characterised by a series of ambitious reforms intended to reposition the nation as a competitive and cooperative space power. At the centre of this reform agenda is Indian Space Policy 2023 (ISP 2023), which, along with the liberalisation of Foreign Direct Investment (FDI) regulations and recently issued Norms, Guidelines, and Procedures (NGP) by the Indian National Space Promotion and Authorization Centre (IN-SPACe) for space activities authorization, constitutes a revolutionary change in India's traditional approach to outer space regulation.

With its decision to liberalise FDI in the space sector, it is quite clear that the aim is to draw global capital and know-how into the major verticals of the space value chain, such as satellite production, launch vehicles, ground stations, etc. The liberalised FDI policy allows foreign investors to hold large stakes in Indian space start-ups and joint ventures. This opens up huge potential for cross-border technology transfer, innovation and commercialisation. However, as aspirational as this may seem, the impact is diluted by the restrictive policies like NGP, which insist on maintaining ownership, control and management in the hands of domestic players. The NGP authorisation process creates friction by imposing restrictive conditions on licensing, liability, safety and compliance with international treaty obligations. Although there lies an underlying explanation of national security and interest, it has raised concerns regarding its practical feasibility. This includes issues such as providing joint ventures' intellectual property rights and their enforceability, balancing liability and multi-jurisdictional operations combined with overall regulatory predictability necessary to instil long-term investor trust and confidence.

The article aims to critically examine the interlinkages vis-à-vis the friction between India's attempts to foster growth in the space sector through two-pronged steps; the FDI liberalisation on the one hand, and its concurrent commitments to strategic autonomy, protection and national security on the other.

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FDI Liberalisation: Ambition and Opportunity

The liberalisation of FDI in the space industry is marked as a strategic tipping point in the entire initiative of repositioning India in the global space economy. The notification issued in the aftermath of the approval of the amendment by the Union Cabinet in the FDI policy of the space sector seeks to sync India's vision of a self-reliant India with its space industry policies. The reform allows up to 100% FDI in various segments of the space sector. This ambitious move intends to integrate India strongly into the global value chain of the space sector and drive innovation and commercial advancement of technologies by attracting foreign capital and technical skills.

The liberalised regime is sectorally differentiated, with individual FDI levels based on the nature of the activity. For example, FDI up to 74% on the automatic route is allowed in satellite manufacturing, 49% on launch vehicle systems, and up to 100% on the manufacturing of components and systems, and some of the key activities with national security implications, like remote sensing and military satellite applications, are still under government clearance beyond specified limits. This tiered framework is specially tailored to balance economic openness with strategic prudence, acknowledging the dual-use aspect of space technology and the need to protect sovereign capabilities.

The liberalisation is happening when the international space economy is rapidly growing and is expected to reach $1 trillion by 2040, as the current market size is estimated at $570 billion. However, the Indian share is a mere 2–3% and indicates huge untapped potential. With organisations like ISRO changing gears to research and deep space travel, the policy aims at transferring commercial space activity to private players. The liberalised FDI policy is therefore not so much an investment reform as it is a strategic facilitator of India's space commercialisation drive.

One of the most important advantages of such liberalisation is the expected growth in capital inflows, which would widen manufacturing, research and development, and testing infrastructure spanning satellite components, ground systems, and launch vehicles. This, in turn, is anticipated to generate a boom in high-skilled jobs in engineering, data sciences, and aerospace operations. In addition, foreign investment is sure to introduce cutting-edge technologies like reusable launch systems, miniaturised satellites, and enhanced telemetry. Moreover,

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the reform will most likely facilitate India's integration into international value chains. With India's competitive advantage in low-cost launch services and its developing private sector, the new regime of FDI is able to turn the country into a desirable place of manufacturing and innovation for international space businesses. It also supports the 'Make in India' policy, not just by mobilising funds but by ensuring that such investments result in long-term capability-building, intellectual property creation, and strategic self-reliance.

Authorisation Guidelines Under NGP: Ensuring Indian Control

Underpinning the changes being brought in the regulatory scheme of the space sector in India are the NGP, which stipulate a definite requirement that only Indian players can apply for authorisation to carry out space activities within India. Though foreign participation is not prohibited, it is regulated rigorously, as foreign players need to cooperate through Indian subsidiaries, joint ventures, or other accepted partnership frameworks. Importantly, the guidelines mandate that management and control have to be with Indian entities, and any material change in control, for example a transfer of shares to a foreign partner, requires a new round of authorisation. These stricter norms are argued to be justified in light of international obligations and national security reasons.

International Norms' Compliance

India, being a party to the Outer Space Treaty 1967, incurs legal commitments specifically under Article VI. These commitments make India globally responsible for all the space activities conducted by its organisations, irrespective of their governmental or non-governmental status. This can be taken as one of the reasons for the strict authorisation process. As part of the treaty commitments, the signatory state is obliged to authorise and monitor these activities at all times. Thus, by restricting the authorisation access to Indian entities, there is a stronger hold on monitoring and regulating all the space-related activities being carried out from India. Additionally, India has commitments under the Convention on International Liability for Damage Caused by Space Objects 1971, which elaborates the liability regime under the Outer Space Treaty. The liability norms under both treaties attribute liability for space activities to the launching State/s.

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National Security and Strategic Autonomy The space sector holds the status of critical importance, integral to national security and the pursuit of strategic interests.. To hold significant national control over the assets of space applications is a matter of national interest. In light of this, the NGP aims to avoid excessive foreign control over sensitive space technologies and infrastructure. Furthermore, the strict norms of requiring management and control of domestic players also have to do with the protection against threats like unauthorised access to data, leakage of technology or damage. By doing so, it is ensured that the important decisions and operating control stay in the country, thereby further strengthening India's autonomy in the space sector.

Another reasoning tied to the restrictive authorisation process is the maintenance and promotion of technological sovereignty. It is aimed to encourage indigenous innovation and have vital technological know-how within the country.

The Central Conflict: Liberalised FDI v. Restricted Authorisation in India's Space Sector

With the FDI liberalisation in the space sector vis-a-vis stringent authorisation requirements, there is an evident interplay of opportunity and constraint. In the subsequent sections, the friction created as a result of this two-pronged approach is discussed with special focus on IP management, liability, technology transfer and mutual trust and confidence of investors.

Technology Sharing and Transfer

Liberalised FDI is commonly seen as a trigger for technology transfer. India believes that by opening the space sector to foreign investors, it can access advanced technology, operational experience, and international best practices. This is particularly critical as India aims to upgrade the value chain from the role of a low-cost launch provider to becoming a centre for high-value satellite fabrication, deep-space missions, and emerging applications like satellite-based Internet and earth observation analytics. Foreign collaborations translate into expertise and resources that are required to move the indigenous research and development, standards of manufacturing, and new business models necessary to push the Indian space sector to world-class.

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However, the requirement of Indian management and control, as dictated by the guidelines of authorisation, can go a long way in suppressing the potential for effective technology transfer. Foreigners have to conduct business through Indian subsidiaries, joint ventures, or other partnership arrangements, yet are excluded from having command over operations and decision-making. This results in a situation in which foreign companies will be reluctant to give away their best or proprietary technologies. The loss of competitive edge, lack of intellectual property protection, and regulatory uncertainty also deter the transfer of advanced innovations. In reality, joint ventures tend only to transfer incremental technology in sensitive or dual-use fields like navigation in satellites, propulsion technology, and secure communication.

For instance, the bilateral collaborations between India and the US in the space sector continue to be plagued with strategic divergences and policy asymmetries. Although India seeks access to advanced United States space technologies through foreign investment and cooperative ventures, the lack of sustained, trust-based partnerships have limited substantive technology transfer. It is further reinforced by structural imbalances between the capital and know-how contributed by foreign firms and the commercial returns available in India's nascent private space market. Consequently, this policy structure leads to incremental technology transfers focusing primarily on assembly or subsystem manufacturing rather than transformative innovations. The blend of conservative policy sentiment and ambiguity around the regulatory framework further limits the scope and scale of joint ventures and FDIs.

Mutual Trust and Confidence of Investors

A further intended advantage of FDI liberalisation is to communicate India's receptiveness to international cooperation. Government hopes to foster mutual trust with foreign counterparts and stimulate long-term strategic investments by reducing entry barriers and streamlining investment channels effectively overseas. Predictable and unambiguous policies facilitate securing high-quality investments, foster an innovative environment and risk-taking endeavors. Restrictive authorisation regime's emphasis on Indian control reflects protectionist tendencies and remains somewhat open at best under certain circumstances. Regulatory

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uncertainty kicks in with the necessity for fresh authorisation upon a substantial change in control involving shareholding or board composition shifts.

Unless the process of authorisation is transparent, time-bound, and appealable, it can be seen as arbitrary, or even intrusive. This uncertainty can undermine the very trust that FDI reforms seek to create. Foreign investors, especially those contemplating large or long-term projects, are discouraged by the possibility of surprise regulatory intrusions or the denial of operational autonomy.

Overseas investors might consequently exercise restraint, restricting their exposure to low-risk projects or prefer short-term alliances over deep strategic partnerships. FDI flow may fall short of policy targets, thereby damaging India's global space leadership aspirations badly. India must synchronise its authorisation processes with global best practices, ensuring transparency and equitable recourse for all stakeholders. For instance, developed spacefaring nations such as the United States and the European Space Agency States prioritise regulatory licensing and export control mechanisms (ITAR, EAR, and ESA Framework, to name a few) over stringent ownership and management caps to protect strategic technologies. This promotes a clearer and more predictable framework for foreign investors, bestowing them with operational control, thereby encouraging deeper technology sharing and high-value innovation.

Strategic Control and Decisive Powers

The basis for retaining control and management in Indian hands is grounded in the necessity to protect national interests. Space constitutes a realm of paramount strategic significance, having huge implications for national security and burgeoning economic growth. By holding on to decisive control, the government seeks to forestall foreign domination, guarantee compliance with global obligations, and preserve the integrity of vital infrastructure.

This strategy may, however, weaken the interest of foreign investors in investing significantly in the partnership. Strategic choices regarding research and development (R&D) focus, capital investment, market penetration, and intellectual property management are critical to success in high-technology industries such as space. If foreign partners are kept in minority or passive status, they may be less inclined to invest in aggressive projects, to transfer their best practices, or to

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assume substantial risks. Absence of an active voice in decision-making may cause disengagement and result in foreign investors contributing nothing more than funds and not the entire range of strategic, managerial, and technological advantages.

India can therefore end up with "capital without control", attracting investment but losing out on the generative power of authentic international partnerships. The industry could become stagnant in innovation, efficiency, and global reach, as international partners reserve their best to offer in markets where they exert more influence. To realise the full potential of FDI, India must find a balance between national control and authentic strategic cooperation.

Patent Rights and Intellectual Property (IP) Management

India's Norms, Guidelines, and Procedures (NGP) for the space sector bring considerable complications in the management of patent rights and intellectual property (IP), especially with regard to foreign investment and technology cooperation. The NGP's control and management provisions can have the unintended consequence of deterring high-value, IP-specified foreign investment. Joint ventures and technology transfer arrangements between Indian and foreign parties can give rise to new, co-owned IP assets. This collaborative model is recognised worldwide as a catalyst to spur indigenous capability development and the commercialisation of new technologies.

Still, the NGP requirement that management and control shall continue to rest with Indian entities presents some challenges to effective IP management. Foreign collaborators, typically the providers of cutting-edge technologies and proprietary know-how, might be unwilling to transfer their most valuable IP if they are not to have controlling influence over its use, protection, or exploitation. The apprehension of misappropriation or unauthorised exploitation of their technology increases when operational choices are outside their direct control. This is further aggravated by India's absence of a specific, sector-driven legal regime for space activities. The Space Activities Bill, which is yet to be introduced in the Parliament, is intended to make clarifications pertaining to IP rights, liability, and mechanisms for the resolution of disputes.

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Without it, there remains uncertainty over joint IP ownership created by cooperative development, and the mechanism to resolve conflicts. This raises issues for foreign parties to determine their legal position and remedy if disputes arise over patent entitlements or technology use.

Implications for High-Value Foreign Investment

Intellectual Property holds significant importance within the domain of technology and knowledge sharing, particularly in the field of space activities. Thus, there is a need for the IP rules to be unambiguous and enforceable in order to ensure that innovative technology and partnerships are attracted in the long run.

Lacking an impact on the IP management or failing to be able to secure proper legal protection will have a direct adverse effect on foreign partners, who might limit themselves to less sensitive projects or deny sharing their most advanced innovations at all. Consequently, this will restrict India's access to the latest and most advanced technologies and will eventually reduce the perks of international collaboration.

In order to address these challenges, it should be made a top priority to enact a comprehensive legislative framework that explicitly stipulates IP ownership, licensing rights and resolution procedures in case of conflicts in joint ventures and foreign collaborations. Bringing in a specialised mechanism for the resolution of disputes in case of IP conflicts, such as specialised arbitration panels or courts, would garner confidence among foreign investors. It is only by ensuring transparency, certainty and enforceability with regard to IP rights and their management that India can best utilise its potential of the FDI liberalisation policies while upholding the strategic goals under the NGP.

The Space Activities Bill (2017), contained important provisions pertaining to space regulatory mechanism (Chapter II), authorisation and licencing for commercial space activities (Chapter III), registration of space objects and liability (Chapter IV), and the protection of IP rights (S.25, Chapter VI).

However, the 2017 draft received criticism from industry stakeholders. Therefore, a revised draft, Space Activities Bill (2025), which incorporates the previous suggestions of stakeholders and also attempts to address the complexities of

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private participation in the space sector, will now be circulated among the public, stakeholders, and ministries for comments.

Issues of Liability and Risk Allocation Complexity

IN-SPACe can impose that private operators obtain third-party liability insurance with the Republic of India as a co-insured to protect the state liability for damage arising out of space objects. This is an essential protection, considering that India has international liability for all space activities by its entities.

Incomplete or non-symmetric liability arrangements can constitute a significant disincentive to foreign participation, particularly in high-risk operations like launch services, satellite operations, or debris mitigation. In the absence of strong mechanisms for sharing risk, indemnification, and insurance protection, foreign investors may refrain from the most vital and innovative areas of the space industry. The assignment of liability in joint ventures or cooperative projects, particularly those with foreign partners, is riddled with complexity. The possible tussle lies where although the management and control are completely in the hands of domestic players, with the involved economic and operational exposure for foreign investors who will have an extremely lower degree of right to impact the risk-mitigating plans or operating decisions, there is likely to be a battle over liability for accidents, breakdowns and third-party claims. This complexity is further intensified in the absence of any specified risk-sharing and reinsurance mechanism in India's nascent space insurance market. This can be resolved through the development of the insurance industry in the space sector, unambiguous and transparent contractual arrangements for distributing liability and establishing dispute-resolution mechanisms which can eventually foster confidence in the parties.

It is erroneous to state that the persisting conflict between FDI liberalisation and restricted authorisation in India's space industry is a double-edged sword. Although there exist positives to the reforms which have created windows of investment and cooperation, there still lies a long way to discover a better framework that can balance the positives with the looming challenges associated with technology transfers, securing of IP rights, participation in strategic decision making, mutual trust and confidence building and apportioning liabilities. In order to truly harness the untapped potential of foreign investment, there is a need to

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resolve these conflicts, frame open policies in a true sense and establish risk-sharing arrangements so that the returns and benefits of international collaboration are not diluted by the regulatory overreach.

Conclusion

India's space sector is at a crucial turning point, accompanied by great ambitions and revolutionary possibilities. However, as much as these actions are directed towards fostering growth and innovation by strengthening international collaboration and increasing India's global share in the space industry, the concurrent focus pertaining to management and control over the space enterprises poses a conflict of interest. While they are backed with an argument of catering to sovereignty, security and national interest, the dichotomy threatens to obstruct the influx of foreign investment, cutting-edge technology and know-how, which are critical in realising India's goals in the space sector.

It is imperative to reconcile this tussle between strategic autonomy and incentivising foreign investment. This requires more integrated and investor-friendly policies. Additionally, the authorisation and licensing process needs to have more clarity, as this will generate reliability in regulatory channels, leading to a higher degree of investor confidence and lower barriers to entry for foreign investors. This also includes removing ambiguity in the framework pertaining to an effective protection scheme for foreign investors, especially in the areas of intellectual property rights, technology transfer and mutual risk sharing. There needs to be a well-developed mechanism for dispute resolution, negotiations and fostering open communication to further solidify mutual trust and confidence and build long-term cooperation. In the absence of such guarantees, the risk of engaging in business within the Indian Space industry might outweigh its potential benefits.

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RIGHT OF NATURE AND APPLICABILITY BEYOND EARTH: OUTER SPACE AND ECOLOGICAL JURISPRUDENCE

Nirbindu Banerjee[*]

Abstract

As the celestial ambitions of humanity have expanded, legal and ethical questions surrounding environmental integrity in outer space remain a point of contention. A jurisprudential, doctrinal and legal philosophy-dependent discussion surrounding the applicability of the emerging 'Right of Nature' doctrine to tackle environmental issues in outer space is the objective of this article. In the vein of analysing the possible transposition of the earth-rooted legal personhood into extraterritorial jurisprudence, this article integrates the intellectual contributions of many contemporary philosophers, like David Boyd and Cormac Cullinan. It looks into the recognition of celestial ecosystems as judicial subjects while interrelating post-humanist and relational ontologies. The anthropocentric and instrumentalist structure prevalent in the domain of international space law is put under the analytical eye in this paper, which follows a tripartite thematic structure. The first part discusses the Right of Nature jurisprudence, outer space environmental issues and the existing legal framework. The second part analyses the integration of this eco-centric jurisprudence in the field of international space law. The last part concludes with a *de lege ferenda* interpretation of applying Rights of Nature (RoN) jurisprudence and what it might entail in terms of environmental protection.

Keywords: Environmental law - Outer Space Treaty - Rio Declaration - Space debris - UNCOPUOS

Prologue

The augmentation of anthropogenic activities in outer space, from the deployment of an expanding number of satellites to the impending extraction of extraterrestrial resources, has been leading towards unprecedented and neoteric ecological consequences. From orbital congestion, satellite collision, to kinetic debris proliferation, the environmental impact as a whole has been the topic of

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contemporary scholarly discussion. According to the European Space Agency (ESA) and its Annual Space Environment Report 2025, every year, 10.5 unintentional fragmentations take place in the space environment over the last two decades. The report clearly suggests that more stringent mitigation procedures must be put in place internationally, since the current levels of adherence to space debris mitigation rules generally are insufficient for creating a long-term sustainable space environment. Socioecological models have been advised and applied to slow down the process of debris expansion, while discussing the anthropocentric nature of these activities.

The intrinsic value of the extraterrestrial environment that can be seen through international law responses, however, has remained somewhat underwhelming. Even the IADC guidelines introduced in 2002 were mainly put into effect to safeguard the future of human spaceflight. Although the United Nations Committee on Peaceful Uses of Outer Space (UNCOPUOS) has established a set of guidelines to mitigate environmental harm from activities, current harm to the environment might still be increasing as an unintentional offshoot of global geopolitics and the modern space race. There is a jurisprudential gap that is indicative of an anthropocentric legal system that views space as a place for exploration, utility, and conquest rather than as an ecosystem that merits legal protection on its own.

Right of Nature Jurisprudence

The Right of Nature Jurisprudence posits that nature has an inherent right to exist, evolve, and regenerate. It is conceived as much more of a self-regulating and independent system, differentiating itself from the environmental law, which predicates protection of the environment based on anthropocentric needs. As Davis and Humphries have noted, conventional environmental laws have the potential to legalise environmental harm rather than prevent it when they place restrictive constraints on human activity. The goal of Rights of Nature approaches, on the other hand, is to create governance structures that protect ecological integrity and avoid upsetting ecosystems.

Nadow and Malony have argued that an ocean stewardship system can benefit from the application of the Right of Nature principle, which may also help to reframe the unresolvable dispute over authority and utilisation of 'Marine Genetic Resources' (MGR), rights and obligations in overall ocean governance. One of the earlier

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versions of this idea can be found in the writing of Christopher D. Stone in his seminal essay, 'Should Trees Have Standing?-Toward Legal Rights For Natural Objects'. He often contests the anthropocentric bias of traditional legal normativity by propounding that the extension of personification that is often given to a corporation could surely be extended towards nature itself. This idea is contemporised by David Boyd, who has documented this doctrine's intellectual and practical development throughout several legal systems, culminating in discussing case studies[1] related to this ideology in the modern world. According to him and other legal theorists, the emergence of the Right of Nature has shed light on the paradigmatic shift from environmental management to ecological justice.

Comparative jurists such as Vinciane Despret and Eduardo Gudynas have suggested that the existing legal models in Right of Nature jurisprudence are based on a transition from liberal-individualistic frameworks to pluralistic and cosmopolitical views of law, and nature and other animals are not just passive elements but active creators of societal perception. Theorist Cormac Cullinan further elaborates on the ontological underpinning behind this principle, explaining how Western philosophy has mostly been a show of 'mechanistic cosmology' that assumes nature to be something that is inert, rather than considering it as an active subject, as seen in eco-centric jurisprudence. This idea is provided with credence by Rosi Braidotti and her relational ontologies, by the support for a reinterpretation of legal subjectivity outside of the humanist framework. For space jurisprudence, it is essential to mention Braidotti's ideals before dealing with the de-anthropocentricity of legal subjectivity in drastically different ecologies.

Outer Space Contamination and Existing Legal Framework

A plurality of phenomena could be considered as contamination or environmental harm of outer space, from mission-related waste to orbital debris. As Rettberg and others have discussed, concerns about possible contamination of the moon and planets were voiced by the international scientific community from the beginning of space travel. According to Tennen, the unanimous acceptance of guidelines for planetary protection from contamination of the outer space solar system, which was integrated into positive international law, has slowed down, and the stringent guidelines have been relaxed, citing the non-possibility of the existence of life in the solar system.

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Depending on the mission type, target body, and scientific inquiry type, the COSPAR Planetary Protection Policy has classified planetary protection requirements into five categories. While these guidelines and classifications have been modified as recently as 2024 by the Committee on Space Research, the concerns about backward and forward contamination still exist. As Mariappan and Crassidis have explained, with the expansion of constellations, overcrowded orbit and an increase of debris, Kessler syndrome becomes a threat that might make orbital areas unusable for satellites in the future. This problem of long-term environmental and navigational sustainability has been enhanced by the growth of mega constellations, be that SpaceX's 'Starlink' or 'OneWeb'. Scholars such as Boley and Byers have noted that satellite re-entries from the Starlink mega-constellation alone might deposit more aluminium into Earth's upper atmosphere than meteoroids, making them the primary source of high-altitude alumina. Environmental and scientific fora, like the UNCOPUOS, are actively debating the possibility of contaminated debris re-entering the atmosphere, orbital lanes becoming saturated, and the increase in light and radiofrequency pollution.

International Space law offers only fragmented safeguards or guidelines. The Outer Space Treaty, heralded as the foundational instrument, only mentions 'harmful contamination' of outer space vaguely in Article IX, quickly followed by a larger emphasis on the harm to the Earth's environment. The lack of recognition of intrinsic ecological value, or a proper definition, haunts it in terms of jurisprudential interpretation. Cinelli and Campodonico have argued that a flexible interpretation of the Outer Space Treaty based on the rules established in the Vienna Convention on the Law of Treaties can make it possible to oblige states to act in a responsible manner. Scholars believe that the Outer Space Treaty's egalitarian language does not resolve the issue of exploiting space as a 'resource'.

Legal measures, like planetary protection, prioritise human use of outer space habitats. The 'New Space Age' power dynamics are intertwined with the current 'uses' of space. Aside from the often-mentioned vagueness, Article IX can be construed broadly in accordance with the precautionary principle and the no-harm rule established in customary international environmental law. On a similar plane of logical reasoning, Article III of the Outer Space Treaty would also make it possible for international environmental law to be applicable to outer space. However, the point of contention, as argued by some scholars, can also remain whether space can

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be considered as an 'environment'. Scholars such as Ćirković and Mitchell state that the 2024-2025 climate advisory opinions can also be transposed and applied to outer space governance, ensuring that customary environmental law can be integrated with Article III and Article IX of the Outer Space Treaty. This includes the responsibility to prevent environmental harm, as paragraph 162-173 of the 'ICJ Advisory Opinion on State Obligations in Respect of Climate Change' states that a *lex specialis* does not void any other established rules of international law or automatically create a general exception to climate change treaties. While it is not an application of the Right of Nature principle, it is a step forward towards stronger environmental protection in international environments. Additionally, Peter Stubbe has noted that since space debris was specifically referred to as an environmental issue, the UNCOPUOS reference to 'common but differentiated responsibilities' provides justification for both considering the principle itself and taking a closer look at the problems from the standpoint of environmental law.

The Moon Agreement 1979, which leaned towards environmental stewardship, has failed to garner enough ratification. The United Nations COPUOS Guidelines for the Long-Term Sustainability of Outer Space Activities are still primarily anthropocentric and non-binding. Starting from the 64th and 65th UNCOPUOS sessions, there has been a rejuvenated emphasis on environmental protection in outer space. Uncontrolled re-entries and gaps in global coordination had been analysed during dialogues, and an argument for the advancement of the guidelines towards a regulatory framework had been raised. Furthermore, Earth-based environmental monitors have focused on the increased air pollution associated with the burning of exotic fuels and hypergolic propellants used in frequent launches. ESA and UNEP's 2022 COP27 side panel had also brought attention to the dangers of black carbon build-up from space launch operations, although not prominently featured in the takeaways of the conference. On the other hand, the first piece of legislation that was truly created to address environmental concerns in space was the Space Debris Mitigation Guidelines. Even if it is a significant start in the right direction, it might not be adequate in the long run, particularly because it makes no mention of any specific types of environmental preservation. Marino and Cheney have established that the argument of reforming them to place environmental concerns at their core is a real possibility. Parallelly, even though international environmental law has come a long way since the Stockholm Declaration and Rio Declaration, the conceptual apparatus and the necessity to apply environmental law

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to outer space are still lacking. As Boyle and Freestone have noted, the existing framework before the last decade was primarily anthropocentric, utilitarian, and reactive in nature. When it comes to the ecological integrity of celestial bodies or orbital zones, which are regarded as *res nullius* or merely instrumental domains, this restriction is especially noticeable. Enshrined in Principle 15 of the Rio Declaration, the precautionary principle is the legal doctrine that might be the most applicable in restraining activities that cause severe environmental harm. Accordingly, extending the Rights of Nature to space could be framed as a corollary of Article IX Outer Space Treaty's obligation to prevent harmful contamination, which is supported by international customary principles. When applied to space, this principle would forbid operations like resource extraction on asteroids, kinetic anti-satellite testing, and uncontrolled mega-constellation deployments until thorough environmental impact assessments and sustainability thresholds are set.

Possibility of Jurisprudential Transposition

The transposition of the Right of Nature in outer space jurisprudence can be described as a radical, yet necessary step forward. One could argue that interplanetary ecologies, orbital regimes, and celestial entities are all more-than-human collectives that should be recognised by law. Renowned ecologist Holmes Rolston III has argued that nature should have moral considerations, irrespective of the closeness or lack thereof to human life. As an extension of that theory, it can be argued that the environment in outer space, possesses the same ontological dignity that warrants legal standing as any other existing environment in proximity to us. Other Scholars like Bosselmann[2] have argued for Earth jurisprudence, which is based on ecological integrity. The extension of these principles is necessary for planetary and interplanetary sustainability to have an actionable legal framework. With space travel becoming frequent and exploration in the new age becoming common, 'cosmo-legal continuity' would justify the topography of other celestial bodies to be considered for personhood, just as the rivers and forests on our planet. A spatialized ontology of law, in which law is an immanent spatial ecology that co-produces meaning with matter rather than a remote sovereign structure, is further supported by Andreas Philippopoulos-Mihalopoulos' research. This jurisprudential paradigm calls for an integrated framework of legal responsibility across spatial scales, and questions the division of legal significance between Earth and outer space when applied to orbital debris fields or regolith plains.

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At the regional and international levels, the rights of nature have also been considered. Annual reports on "Harmony with Nature" have documented the rapid expansion of Rights of Nature laws and related initiatives since a 2009 UN General Assembly Resolution. Rights of Nature was recognised by the International Union for the Conservation of Nature (IUCN) as a framework for planning and decision-making, with the idea that it might serve as the foundation of a new civilising pact. Ecuador, Bolivia, Uganda, and several other countries have approved legislation recognising natural rights throughout their domains. The jurisprudence of the Whanganui River in New Zealand, the Ganges and Yamuna in India, and the Amazon can provide instructive paradigms in these cases.

The legal recognition of topographical entities has always been informed by indigenous cosmologies and relational ontologies. A similar jurisprudential logic might also be applied to outer space, where the Moon, for example, might be considered an ecological subject which is to be protected from degradation. One may also envision a Universal Declaration of the Rights of Cosmic Nature, which could be an international instrument similar to the Bolivian Government's planned Universal Declaration of the Rights of Mother Earth. Rights to cosmic integrity, non-contamination, and evolutionary potential could theoretically all be outlined in such a proclamation. In addition to the general principles, the concept of the *erga omnes* obligations might also support the Right of Nature argument while mentioning the duty or state responsibility towards the international community as a whole. William B. Altabef has argued that the environmental personhood concept and its application to celestial bodies can be a possible avenue towards creating an effective regulatory mechanism. However, a limitation of institutional capacities of international bodies or the very practical possibility of national opposition due to conflicting interests can be dampeners on an otherwise innovative ideological implementation.

Jurisprudential transposition, however, necessitates attention towards two different aspects as well. Firstly, it absolutely needs to be understood that such transposition is not a mere act of analogical extension, but a change in legal ideas and their ontological and epistemic framework. The works of Anna Grear are particularly apt for this context, where her ideas particularly mesh well with outer space issues like orbital debris, geophysical resonance, or atmospheric change and subvert the binary of inert matter and legal subject. Once thought to be purely aspirational, Kotze and

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other academics have examined how judicial and administrative interpretation is giving them a normative bite. When applied to the field of space law, this strategy would enable organisations like UNCOPUOS or the ITU to reinterpret current legal documents from an eco-centric perspective. Secondly, legal transposition also demands careful attention to the discontinuities between terrestrial and outer space governance. As the fragmentation of current space governance has been pointed out by scholars, successful transposition would require institutional guarantees, shared epistemic interpretation and vocabulary.

Challenges and Obstacles

First of all, operating the Right of Nature principle in space faces its primary challenge in the form of fragmented governance in the outer space domain. Effective jurisdictional authority, which would be needed in the case of applying ecological jurisprudence, is impeded by the Outer Space Treaty itself. An effective reconfiguration based on stewardship could be discussed for the implementation of the Right of Nature ideology. The international regime that governs the deep seabed can be a parallel in this scenario. It is administered by the International Seabed Authority under the common heritage of mankind principle, and space governance for ecological jurisprudence could be remodelled as a similar custodial regime. Additionally, the Right of Nature principle has found research and expert support in the governance of the Antarctic region, where scholars have suggested utilising the principle to consider whether the Antarctic or its natural components have or should be granted rights. The analogical similarity between outer space and Antarctic governance is also considered as a point of support.

Secondly, the epistemological conflict is visible and creates an obstacle in the discussion of such an application. Law itself, being an anthropocentric institution, has always been a privilege for rational and independent humans. The post-human legal imagery needed for the application of the Right of Nature would have to have considerations for distributed agency and interspecies relationality. Bruno Latour has noted that instead of being a diplomacy of beings, law is often practically represented as a patchwork that connects everything within the social body and yet remains superficial. According to him, 'Law' is indeed outside of humans, but nothing that enables us to read nature's inalterable message under the altered text of humans[3]. Various interpretations of his work enumerate that his description of law

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is free of political connections and more akin to a living process actively constructed through everyday practices. Thus, it can be theorised that substantial elements of the law-making process often have an impact that is not always apparent, and must be considered to be equally important as the direct anthropocentric sources.

The 'Right of Nature' theory is further corroborated by the transversal subjectivity and affirmative ethics in the works of Braidotti, which would mean that in the context of international space law, celestial bodies are 'vibrant matter' rather than inanimate resources. Such an ideological reorientation is obviously easily theorised but hardly ever implemented, as it mandates that legal recognition is not seen just as a concession to environmentalism. As previously mentioned, space-faring States are most likely to be against a stronger environmental obligation in outer space, with the chances of commercialisation and profit-making on the horizon. Hence, domestic laws and diplomatic interests of those States would be in direct conflict with the introduction of the Right of Nature in outer space.

Thirdly, even the progressions of 'Right of Nature' itself have been varying and dependent on various cultural and institutional contexts, as noted by Kaufman and Martin. Because of such diverse progressions and reasoning, it is difficult to apply the same to a different legal field altogether. The evolution of rights of nature is also not without debate. In India and the United States of America, among other places, judicial rulings acknowledging the rights of nature have since been contested and overturned. Some analysts like Calzadilla and Kotze doubt the effectiveness of rights-based strategies in the absence of broader social changes, emphasising the necessity of establishing implementation strategies and assigning institutional duties to guarantee that nature's rights are upheld both in theory and in reality. According to Kotze, the shift to ecological constitutionalism necessitates not just the adoption of new laws but also the modification of existing legal frameworks to take into account the ontological agency of nature.

Epilogue

The outer space governance framework and environmental protection in lieu of future space activities is often a perfect space to implement an ideological shift that reinterprets the human-nature relationship. Within the corpus of international space law, a novel multilateral legal instrument based on the advancement of existing soft laws and other provisions could be the answer to the dynamic shift that is needed

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for ecological protection of extra-terrestrial nature. Such an instrument, tentatively designated as a 'Cosmo-legal Protocol', would ideally be framed under the auspices of existing bodies in the international space law regime, and might even work as an annex to relevant space treaties. It would serve to uphold the substantive and procedural legal rights of space-based ecological systems, from celestial bodies and inert matter to microbial ecosystems that may be found in the future. Such a document might establish the legal status of outer space ecosystems, forbid actions that destroy their natural structures, and enforce stewardship duties based on eco-centric and preventive concepts. It would, thus, fill in the gaps of normative nature left by existing instruments, which have considered celestial bodies in a passive perception of 'sites to be used'. Having a legal standing for outer space ecology would also bolster the progressive direction of international environmental law, similar to the development of the Right of Nature jurisprudence. Several successful and failed attempts to recognise the doctrine have been made in various countries, and comparative studies have ensued to discuss such progressions. The primary rights that can be seen at face value are, however, the right to exist and evolve without anthropogenic contamination; the right to protection from orbital congestion and debris and the right to ecological restoration following exploitation. To implement such norms, existing institutions might be utilised, or a separate tribunal could be envisaged, depending upon international diplomacy and agreements.

Notes and References:

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WEAPONISED SKIES: AIRSPACE BANS AND THE EROSION OF AVIATION NEUTRALITY

Dr. Garima Tiwari[*] & Praddosh S M[**]

Abstract

The Chicago Convention 1944 envisioned civil aviation as a mechanism for global friendship, but in modern practice, the States have increasingly repurposed aviation infrastructure to advance their own coercive foreign policy. This article critically analyses the "weaponisation" of sovereign airspace by applying the framework of "Weaponised Interdependence" to the legal regime of the air. It argues that States are exploiting the Chicago Convention's structural vulnerabilities to create zones of "exceptional" jurisdiction by juxtaposing the "active" coercion of airspace bans with the "interventional" coercion of safety protocols. This article employs Articles on Responsibility of States for Internationally Wrongful Acts (ARSIWA) and recent jurisprudence from the MH17 trial to scrutinise and demonstrate that the recent airspace restrictions fail the legal tests of proportionality and non-punitive intent required for lawful countermeasures. It concludes that unless the International Civil Aviation Organisation clarifies the limits of Article 9, the global aviation network risks fragmenting into competing spheres of geostrategic exclusion.

Keywords: ARSIWA - Chicago Convention - MH17 - Qatar Blockade - Sovereignty

Introduction

The Preamble to the Convention on International Civil Aviation, 1944 (Chicago Convention) articulates a vision for civil aviation as a mechanism to "create and preserve friendship and understanding among the nations and peoples of the world." Yet, nearly eighty years later, the legal architecture designed to facilitate global connectivity is increasingly being repurposed as a choke-point for geopolitical leverage. Far from the apolitical "conduit" imagined by the drafters at Chicago, the sovereign airspace of States has emerged as a primary theatre for coercive statecraft. This article posits that this phenomenon represents a structural shift in international law where there is a transformation of national airspace from a protected zone of safety into a mere vehicle for "weaponised interdependence", adopting from the

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work of Henry Farrell and Abraham Newman. By exploiting the "centrality" of specific aviation hubs and the "panopticon" nature of air traffic surveillance, States are leveraging the very connectivity of the system to isolate adversaries. While there is a lot of discussion around the emerging threat of space warfare, the "weaponisation" of the atmospheric skies has effectively pre-empted it.

When looking into this transformation, one must recognise that the Chicago Convention did not emerge in a vacuum but was a culmination of a historical dialectic process between "freedom of the air" and "State sovereignty" that dates back to the Paris Convention of 1919. As has been noted in history, the Paris regime solidified the concept of "closed skies" to protect national security in the wake of World War I aerial bombardments. This historical insistence on absolute sovereignty, originally intended as a defensive shield, has now been weaponised as an offensive sword. This produces a fundamental legal tension whereby aviation law, traditionally drafted to prioritise technical safety and economic liberalisation, is increasingly undermined by state practice that leverages legal ambiguities to bypass international obligations. States are not imposing airspace bans for the objective safety reasons as envisaged in Article 9 of the Chicago Convention, but as a tactical strategy to inflict economic burden, as was clearly observed in the 2017 Qatar Blockade and the 2022 EU-Russia airspace closures. What's even more alarming is the misuse of the safety architecture itself, specifically Air Traffic Control (ATC) and distress protocols, which have been manipulated to intercept political dissidents, as evidenced by the 2021 diversion of Ryanair Flight FR4978.

Against this backdrop, this article addresses two critical research questions: Whether the principle of 'complete and exclusive sovereignty' in the Chicago Convention inadvertently enable the weaponisation of civil aviation for coercive diplomatic ends, and does the current legal regime provide adequate remedies to preserve the neutrality of the skies? It argues that the current framework has failed to distinguish between legitimate security measures and coercive statecraft, thus allowing States to create zones of "exceptional" jurisdiction where standard rules of international cooperation are suspended.

The Structural Vulnerability: Air vs. Sea

The legal plausibility of these coercive measures stems from a foundational structural vulnerability in aviation law, one that becomes very evident when contrasted with

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the Law of the Sea. Under the United Nations Convention on the Law of the Sea, 1982 (UNCLOS), the regime of the sea presumes openness and while sovereignty is limited to clearly defined zones and does not apply to the high seas. Ships enjoy the right of innocent passage through territorial waters, a right that coastal states cannot arbitrarily suspend, as this regime intends to acknowledge that the oceans are a global common where connectivity supersedes territorial exclusivity.

Aviation law, however, operates on the inverse presumption. As German jurist Kay Hailbronner observes, the Chicago Convention rejected any analogy to innocent passage, as it was observed that any aircraft entering sovereign airspace without permission is considered a trespasser, thus subjecting it to interception. This leads to the creation of the "closed skies" doctrine, where there is no automatic right to enter or transit sovereign airspace, and this lack of inherent or customary "right to transit" creates the specific "network topology" where the access to the global network is controlled by "privileged nodes" which are States with critical geographical advantage or market power. Access to airspace is a privilege granted by treaty, either entered multilaterally by the International Air Services Transit Agreement (IASTA) or bilaterally through Air Services Agreements (ASAs), making it revocable.

In the modern globalised world, where supply chains and just-in-time logistics are an integral part of the global trade stability, the revocation of this access privilege triggers the chokepoint effect, forcing competitors to fly longer, fuel-intensive routes around a blockade. The recent closure of Russian airspace due to the Russian-Ukrainian war to Western carriers has led to Cold War-era polar routes being revived, resulting in additional hours of flight times and millions in operational costs, while the non-sanctioned carriers continue flying shorter routes, creating a distorted market based on geopolitical alignment rather than efficiency. This trend monetises geography as a weapon of economic warfare.

In this sense, airspace functions not merely as sovereign territory but as a vertically displaced border. As Saskia Sassen argues, the modern State reconfigures its authority not by abandoning territory, but by creating "denationalised" spaces of control where global flows can be strategically interrupted. The "weaponised sky" is the ultimate manifestation of this: a space where the flow of global capital (via

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passengers and cargo) can be halted instantly by sovereign fiat, bypassing the need for physical border walls or naval blockades.

Airspace Bans: Retorsion or Unlawful Countermeasure?

The most common manifestation of this weaponisation is the imposition of punitive airspace closure. While Article 1 of the Chicago Convention establishes sovereignty, Article 9 (Prohibited Areas) provides for the only legal mechanism through which a state could close its airspace, citing "military necessity or public safety" reasons. Crucially, the bare text of this provision requires such restrictions to be uniformly applied without any distinction between the aircraft of the State involved and those of other States. This non-discrimination clause was designed to prevent commercial protectionism, but it fails to explicitly address political retaliation. Modern state practice has stretched the definition of public safety to the breaking point, transforming it into what we term "security theatre."

The Fallacy of Self-Judging Security

States have often argued that the determinations of "public safety" or "military necessity" under Article 9 are self-judging, that is, solely under the discretion of the sovereign. This interpretation is legally untenable unless the treaty text explicitly grants such subjective discretion. International jurisprudence has consistently rejected the notion that security exceptions are purely subjective in the absence of express language to that effect. In *Military and Paramilitary Activities in and against Nicaragua (Nicaragua v. United States of America)*, the International Court of Justice (ICJ) held that the specific security clause in question was justiciable and not subject to the "subjective appreciation" of the invoking state, precisely because it lacked the requisite self-judging terminology. Further, in the *Oil Platforms (Islamic Republic of Iran v. United States of America)* case, the Court has confirmed that measures taken under the guise of security must be objectively assessed. More recently, the WTO Panel in the *Russia -Measures Concerning Traffic in Transit* case established that security exceptions are subject to "good faith reviewability" to prevent abusive re-characterisation of trade wars as national security emergencies. Therefore, Article 9 cannot serve as a blanket shield to protect political bans, and closures must be grounded on objective and verifiable safety threats.

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The 2017 Qatar Blockade serves as the paradigm case. The blockading States (Bahrain, Egypt, Saudi Arabia, and the UAE) effectively argued that their obligations under the Chicago Convention were suspended by their sovereign right to protect national security. They framed the airspace closures not merely as Article 9 restrictions, but as lawful countermeasures taken in response to Qatar's alleged support for terrorism, or alternatively, as acts necessitated by an essential security interest. Further, they claimed that the ICAO Council does not have jurisdiction to hear Qatar's complaint since the matter at hand involved "high politics" and national security, which were allegedly outside ICAO's technical mandate. But the ICJ through its decision in *Appeal relating to the Jurisdiction of the ICAO Council under Article 84 of the Convention on International Civil Aviation (Bahrain, Egypt, Saudi Arabia and United Arab Emirates* v. *Qatar)* rejected this argument, affirming that the ICAO's dispute settlement mechanism encompasses any disagreement relating to the interpretation of the Convention, regardless of the "national security" defence.

The "Countermeasures" Trap

Consequently, States have attempted to justify these political bans as lawful "countermeasures", resorting to them as a law of State Responsibility. However, even these legal defences collapse under the scrutiny of the Articles on Responsibility of States for Internationally Wrongful Acts (ARSIWA).

It is also important at this point to distinguish between 'retorsion', 'countermeasures', and 'sanctions'. These concepts are usually conflated in State practice. Retorsion comprises unfriendly but lawful acts which are done in the absence of a binding international obligation. Countermeasures under the ARSIWA permit only the temporary suspension of obligations for the purpose of inducing compliance and expressly prohibit punitive intent. Sanctions, by contrast, are coercive and punitive by design and are ordinarily authorised collectively under the United Nations Charter. Therefore, where there are treaty obligations that govern air services, it can be noted that discriminatory airspace bans cannot be characterised as retorsion and must instead be assessed against the strict requirements governing countermeasures.

Firstly, under Article 49 of the ARSIWA, countermeasures are limited to the "non-performance for the time being" of obligations and must be directed solely to induce

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compliance and not as a punitive measure.[1] Unlike airspace closures justified on national security grounds, the 2022 EU airspace ban on Russian carriers under Council Regulation (EU) 2022/334 is explicitly framed as a "restrictive measure" (sanction) intended to punish aggression. This positions countermeasures not in the ARISWA sense, but rather sanctions in the UN Charter sense, yet adopted unilaterally.

Secondly, pursuant to Article 51 of the ARSIWA, countermeasures must be commensurate with the injury suffered. A total blockade of civil aviation often produces effects that are disproportionate to the gravity of the original internationally wrongful act.

Finally, under Article 54 of the ARSIWA, as James Crawford, Special Rapporteur, ILC, notes in his commentary, the right of third-party/States (like the EU in the Ukraine conflict) to take countermeasures is supposed to be in the general interest, that is, "limited and embryonic."[2] Thus, unless these bans can be classified as retorsion (which applies only where no underlying treaty obligation exists, such as the absence of an Air Services Agreement), they arguably constitute independent violations of international law rather than lawful enforcement measures.

Furthermore, States cannot rely on the exception under Article 89 of the Chicago Convention to suspend their obligations in these cases. It applies only "in case of war" or a declared state of "national emergency". But as we have seen, the Qatar Blockade occurred during peacetime, and the Russia-Ukraine conflict involves armed conflict, however, the EU is not a belligerent party. Consequently, the obligation of non-discrimination under Article 9 remains in force, rendering these discriminatory bans legally invalid.

The Private Sector as Collateral Damage

This weaponisation of airspace has profound implications for the private actors in this sector, which include airlines, lessors and insurers who form the backbone of the global aviation industry. While the Chicago Convention assumes a distinction between the State and the Operator, in practice, when the airspace is being weaponised, the private carriers become pawns in inter-state conflicts. This was quite evidently observed following the EU's 2022 sanctions, which mandated termination of all leasing contracts with Russian carriers. In response to this, the Russian

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government passed legislation allowing for the dual-registration of foreign-owned aircraft, effectively "nationalising" billions of dollars of assets owned by Western lessors.

This "countersanction" demonstrates that when the legal order of the air fractures, the protection of property rights also collapses. The "weaponised border" thus extends beyond the physical sky into the legal ownership of the aircraft itself. This directly undermines the Cape Town Convention, which was designed to standardise transactions involving movable property, like aircraft, to reduce risk. By linking airspace access to asset seizure, States have created a legal environment where an aircraft is no longer a neutral commercial vessel but a sovereign hostage. This leads to a bigger question: If sovereignty allows a State to ban an aircraft, does it also allow the State to seize it? Current practice suggests a dangerous slide towards this conclusion, threatening the financing models that allow modern aviation to function.

The Weaponisation of Safety Architecture

While the airspace ban represents the "exclusionary" form of weaponisation, the manipulation of Air Traffic Control (ATC) represents its "interventional" form, and the diversion of Ryanair Flight FR4978 by Belarus in 2021 is a clear specimen of this end of the spectrum. In this case, the State did not just block the airspace but actively manipulated the safety protocols, which were actually designed to protect it. In May 2021, Belarusian authorities communicated a false bomb threat to a Ryanair flight and instructed the pilot to divert to Minsk. Later, the ICAO Fact-Finding Investigation Report revealed that the bomb threat was "deliberately false" and that the "senior government officials" of Belarus were involved.

Violating the Technical Architecture (Annex 11)

This conduct of Belarus constituted a corruption of the Air Navigation Service (ANS) system. ICAO Annex 11 mandates that ATS units provide "advice and information useful for the safe and efficient conduct of flights." The Chicago Convention relies on a high-trust model where pilots must follow ATC instructions for their own safety, and by transmitting a knowingly false threat, Belarus corrupted the fiduciary role of the Air Traffic Controller. When a State injects false information into this safety-critical loop, it weaponises the pilot's duty of care against their passengers.

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The Abuse of State Aircraft (Doc 9554)

Furthermore, Belarus also scrambled a MiG-29 fighter aircraft to escort the plane. While Article 3 exempts State aircraft from the Convention, it places a due mandate for "due regard" for civil safety. ICAO Doc 9554 (Manual Concerning Safety Measures Relating to Military Activities) specifies that interception be employed only as a measure of last resort, solely to assist aircraft in distress. In this case, the use of a military asset to enforce a political detention transformed the interceptor from a safety instrument into a weapon of coercion. This mirrors the logic of the "shoot-down" policies of the Cold War, exemplified by the *Aerial Incident of 27 July 1955 (Israel v. Bulgaria)*, but adapts it for the era of hybrid warfare: the goal is not to destroy the aircraft, but to capture it.

Judicialising Responsibility: The MH17 Precedent and Corfu Channel

As it has been the long-standing stance of international law, such control over airspace engages State responsibility. The District Court of The Hague, in its MH17 Judgment, clearly states that control over a weapon system in sovereign airspace carries strict liability for the downing of civilian airliners. In this case, the court dealt with the tragic downing of an aircraft, and it clearly held that a State (or a non-State actor under its effective control) bears responsibility for the weaponisation of its airspace, which is directly applicable. Establishing "overall control" over the area or the instrument of interference is sufficient to trigger attribution under ARSIWA.

Crucially, in this context, it is quite pertinent to note the passive form of weaponisation, that is, the failure to exercise Due Diligence. This principle of "due diligence" is anchored in the *Corfu Channel (United Kingdom of Great Britain and Northern Ireland v. Albania)* case, where the ICJ held that every State has an obligation "not to allow knowingly its territory to be used for acts contrary to the rights of other States." The Dutch Safety Board's investigation into the MH17 case revealed that Ukraine had sufficient information regarding the threat of high-altitude missiles to warrant closing the airspace over the conflict zone. By failing to do so, Ukraine arguably prioritised the maintenance of sovereign normalcy and overflight revenue over the safety of civil aviation. This failure constitutes a breach of the positive obligations inherent in Article 1 of the Chicago Convention. Thus, the "weaponised sky" is created not only by the aggressor who fires the missile or fakes the bomb

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threat but also by the sovereign who fails to exercise due diligence in closing the airspace, prioritising political sovereignty over passenger safety.

The Institutional Impasse

The persistence of these practices reveals a deep institutional weakness within ICAO. The organisation was designed as a technical body to standardise navigation, and not as a political body to adjudicate sanctions. As Paul Dempsey argues, the ICAO Council's dispute settlement mechanism is crippled since the Council has become politically deviating in its duty as a judicial body.

Under Article 84, the Council is empowered to decide disputes, but it is composed of representatives of 36 states who vote based on diplomatic instructions rather than legal analysis. As Dempsey notes from his analysis of over 50 years of its dispute resolution mechanism, the Council has "never issued a final decision on the merits" of a dispute, preferring to encourage negotiation.

This "judicial timidity" has created a regulatory vacuum where, when a state invokes "national security" under Article 9, the political nature of the Council leads to hesitancy to challenge the sovereign prerogative, allowing "security theatre" to flourish unchecked. Even when violations are outright clear, as in the case of Belarus, ICAO lacks the enforcement power as it cannot force a state to reopen its airspace or penalise it for a false bomb threat. This whole system relies entirely on the reciprocal self-interest idea that the States will follow the rules because they want their own airlines to be treated well abroad. But this whole assumption falls when the State decides that its geopolitical goals outweigh its aviation interests, leaving the neutrality of the skies unprotected.

Conclusion

The Chicago Convention was drafted in 1944 to prevent the skies from becoming a theatre of war. But, eight decades later, the aviation domain is being transformed into a theatre of "aviation lawfare." States have eroded the fundamental trust that underpins global aviation by weaponising the "interdependence" of the global network. The cases of the Qatar Blockade and the Belarus diversion cannot be merely treated as isolated anomalies, but rather, they are serious warning signs of a disintegrating consensus. This reveals a dangerous shift where the Chicago

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Convention is no longer viewed as a constitution for global cooperation, but as an à la carte menu of discretionary powers to be weaponised against adversaries.

Normalisation of this practice would risk fracturing the global aviation network into competing spheres of influence, where access is a privilege granted to allies and denied to rivals. To restore the integrity of the skies, the international community must move beyond the archaic binary of "sovereignty versus freedom," and it must embrace a modern conception of responsible stewardship, where the sovereign right to exclude is tempered by the peremptory duty to facilitate.

In answering the question posed at the outset of this article, it becomes clear that the principle of absolute sovereignty, when decoupled from the duty of non-discrimination and good-faith safety obligations, does enable weaponisation. Current remedies, either through ICAO's politicised Council or the slow-moving ICJ, are inadequate to address real-time "lawfare." The MH17 judgment offers a glimmer of accountability, establishing that States cannot hide behind proxies when they weaponise the skies. However, unless the international community reasserts the reviewability of security claims and the sanctity of safety protocols, the "friendship and understanding" promised by the Preamble of the Chicago Convention will remain a casualty of the weaponised sky.

Notes and References:

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SLOT HOARDING: UNRAVELLING REGULATORY IMMUNITY, STRATEGIC FLIGHT CANCELLATIONS, AND THE COMPETITION

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Abstract

This paper examines how the dominant Indian carrier, namely IndiGo, has cancelled scheduled flights while retaining airport slots, exploiting DGCA slot-retention policies to entrench market power. It covers two core legal questions, they are; whether slot hoarding as the dominant flight carrier and cancellation of flights constitute abuse of dominance? and whether DGCA regulations for flight transport acts as antitrust immunity for the anti-competitive practices, such as slot hoarding and flight cancellations? The authors argue that these tactical cancellations can amount to abuse of dominance under Section 4 of India's Competition Act, 2002, as they effectively "limit or restrict" services. Yet sectoral regulation has insulated airlines from competition scrutiny: the DGCA focuses on safety and slot release, while the CCI has only belatedly intervened after public outcry. A comparative analysis of the European Union shows that the EU law (Regulation 95/93 and cases like Delta/Heathrow) actively polices slot misuse via usage mandates and structural remedies. The authors try to gather lessons from the EU laws on slot hoarding and their integrated competition law and aviation law framework, and explore how in the existing competition law framework more scrutiny can be achieved for a better integration between competition law and aviation law in India.

Keywords: CCI - DGCA - Flight cancellation - IndiGo - Regulatory immunity - Slot hoarding

Introduction: The IndiGo Flight-Cancellation Crisis and Market Dominance

In December 2025, IndiGo, India's largest carrier with roughly 65% domestic market share, abruptly cancelled around 5000 flights amid crew-shortage compliance with new rest rules. These cancellations stranded tens of thousands of passengers during peak travel season. The Directorate General of Civil Aviation (DGCA)

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initiated an inquiry into the operational failures, and the Competition Commission of India (CCI) took cognizance of complaints, probing whether IndiGo's conduct violated competition law. Such voluminous cancellations by a dominant carrier raise the doubt of strategic manipulation of slot allocations to foreclose rivals. Though framed as an operational crisis by Indigo, Ashok Chawla, former aviation and finance secretary, who was also CCI chairman, suggested that IndiGo's market power, and slot-control and flight cancellation may warrant a prima facie case of 'abuse of dominance'.

The question herein is, can Indigo be held liable under competition law? Anchoring on the sec. 2(r), 2(s) and 2(t) of the Competition Act, 2002, the relevant market can be based on the relevant geographic location and relevant product (substitutability based on price, characteristics, and use). Thus, if we consider the relevant market to be India's low-cost flight carrier, Indigo with 65% of the market share, tops the sector.[1] In the alternative, if we consider slots as the relevant market, each airport will have to be treated as an independent relevant market.

Thus, the first question that arises is whether slot hoarding by Indigo as the dominant low-cost carrier in the market constitutes an abuse of dominant position. The review of different literature and the practices carried out by the EU indicate it to be an anti-competitive practice. However, the second question is whether the aviation regulations by DGCA, which incorporate 'Grandfather rights' and safety regulations, act as justification for flight cancellation. There appears to be an overlap between the aviation law and the competition law in this connection. DGCA's slot coordination guidelines, as per the 'Use it or Lose it rule', mandate that airlines only hold slots they intend to use. Airlines cancelling flights at the last moment get to retain historical slot rights by citing "unavoidable" disruptions. Meanwhile, the CCI must determine if these cancellations, regardless of intent, amount to an abuse of dominance through denial of service to the market under Section 4 of the Competition Act 2002. Thus, the fact that regulatory oversight has created a de facto immunity through sectoral compliance (with safety rules, roster norms, etc.) shields airlines from competition challenges, even when the harm to consumers is evident.

In search for a better model, under the first sub-heading this paper tries to analyse the aspect of the slot allocation and retention under the DGCA rules, thereafter it asks the quintessential question whether slot hoarding and flight cancellation can be

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considered as abuse of dominance and an exclusionary conduct under the Indian competition law jurisprudence, then it tries to analyse how aviation regulations mandated by the DGCA acts as hurdles to competition law remedies and finally it tries to analyse the EU Laws on slot hoarding and how Indian aviation sector can have an integrated framework of competition and aviation laws wherein remedies such as slot divestiture can be incorporated.

Slot Allocation and Retention under DGCA Regulations

Slots, take-off and landing rights at congested airports are among aviation's most valuable assets. In India, DGCA, in coordination with AAI, allocates slots in accordance with IATA domestic guidelines. The incumbents have "grandfather rights" to slots used historically, and new entrants get a capped share, often ~50% of available slots. The 2013 DGCA Slot Allocation Guidelines emphasise that airlines "should only hold slots that they intend to operate or use". Crucially, they incorporate a use-it-or-lose-it rule: to claim historic slots next season, a carrier must operate the slot ≥80% of scheduled flights in the prior equivalent season. Coordinators monitor both planned and actual operations and warn airlines if they risk falling below 80% use.

The guidelines set formal deadlines (15 January for summer and 15 August for winter seasons) for airlines to return unused slots. If an airline holds slots but postpones cancellation beyond the deadline, it suffers consequences: the coordinator may downgrade that airline's priority for future slot allocation. Also, Rule no. 3 of the DGCA Slot Regulations creates a broad avenue for justifying the non-utilisation of the slots. The regulation also mandates that a registry of offenders (late returners) is to be published. Further, any airline ceasing operations at an airport must immediately surrender all its slots. These rules mirror EU Regulation 95/93's 80% threshold, aiming to prevent wasteful hoarding of scarce slots.

In sum, the DGCA requires active use of allocated slots and prompt hand back of known cancellations. The rationale is to ensure "scarce capacity is not wasted" and allow reallocation to competing carriers. As industry commentators note, slot policies in India have historically favoured incumbents ("grandfather clauses") and disincentivised dynamic reallocation.

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Competition Law: Abuse of Dominance in Slot Hoarding

Under Section 4 of the Competition Act 2002, a firm in a dominant position must not abuse that position by imposing *"unfair or discriminatory conditions on"* services, or *"limiting or restricting … production or services"*. Indian jurisprudence views "services" broadly, and past CCI cases have condemned dominant firms that deny market access to smaller rivals. Here, an airline's slots can be seen as an essential input for offering services; cancelling flights curtails supply in ways that favour the dominant player.

Now the question is whether Indigo can be considered a dominant player in the small flying carrier sector with 65% of the market share and whether the act of retaining a huge number of slots amounts to the use of that dominant position. Critics argue that an airline with a significant quantity of slots could have a high market share. The core concern is that such behaviour is not merely passive ownership of capacity but a strategic means of preventing rival airlines from accessing an indispensable input for market entry, namely airport slots. The Supreme Court, in the *Kapoor glass* case, decided that the effects-based analysis is necessary for determining the abuse of dominant position.

IndiGo's position as a dominant player in the relevant market is clear. The late-2025 crisis where over 1,000 IndiGo flight cancellations in a single week, spurred allegations that IndiGo leveraged its schedules to exclude rivals. If IndiGo cancelled flights but continued to occupy the corresponding take-off/landing slots, it would be abusing essential inputs: slots at congested airports are scarce, indispensable facilities, whose hoarding can foreclose competition. Scholars note that holding slots even when unused creates disruption in the market as it keeps the competitors out. In IndiGo's case, cancellations shaved off capacity while slot retention shut rivals out of the newly-emptied markets, erecting entry barriers. For example, no other airline could readily insert additional flights at Delhi or Mumbai if IndiGo simply kept the slots for cancelled flights, and this is an effective denial of market access under Section 4(c) of the Competition Act, 2002. Likewise, aborting flights without releasing slots artificially reduces supply to consumers (Section 4(b)(i)), preserving IndiGo's pricing power. Such conduct plainly harms competition by entrenching the incumbent. Critically, enforcement here depends on effects: as the Supreme Court reiterated in *Kapoor Glass*, Section 4 targets abuses that demonstrably injure

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competition. IndiGo's cancellations and alleged slot-hoarding had concrete adverse impacts: passenger complaints surged, and service quality collapsed. Empirically, timeliness complaints jumped from 33% to 54%, and a survey found 87% of stranded travellers demanded legal remedy. Passengers were stranded while competitors could not step in, likely keeping fares elevated. These outcomes reflect the classic effects of exclusionary conduct, aligning with Section 4's consumer-welfare focus.

Indeed, aligning with an effects-based perspective, if CCI finds that IndiGo's cancellations plus slot retention restricted supply and foreclosed rivals, it would satisfy Section 4's requirements. Empty flights or no flights or even combined flights, along with the seized slots, shrivelled output and consumer loss, mirrors text book foreclosure. In short, the 2025 crisis can plausibly be seen as an exclusionary abuse by a dominant carrier: IndiGo's slot-hoarding exacerbated service failures, directly harmed passengers, and consolidated its market power. It shows the causal chain from flight cancellations to slot retention to foreclosed competition, in line with Section 4's consumer-welfare purpose. If proven, IndiGo's conduct would then squarely meet the test for abuse of dominance.

Sectoral Regulation as De Facto Immunity from Competition Scrutiny

The DGCA oversees safety and slots ex ante, while the CCI enforces competition ex post. This creates an uneasy overlap. DGCA rules on fleet size, route dispersal, and slot assignment essentially shape market structure. By contrast, the CCI has historically been reactive, punishing price-fixing or collusion after the fact. For years, this implicit regulatory oligopoly stood unchallenged: even large mergers or collapses (Kingfisher and Jet Airways, for example) occurred without antitrust interventions, and the market naturally tipped toward IndiGo except for Air India.

Critically, DGCA's emphasis on keeping slots in incumbent hands through grandfathering and lenient cancellation rules has insulated airlines from serious competition law risk. The DGCA does not view slot hoarding as anti-competitive; it sees it as planning or scheduling issues. Only when safety is at stake does DGCA act firmly, like issuing show-cause notices for flight disruptions. Meanwhile, the CCI traditionally avoids stepping on regulatory toes, especially absent explicit complaints.

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Aviation sector rules have become a de facto shield that carriers can argue that they were forced to cut flights by regulatory crew-rest rules, but how would that be anti-competitive while maintaining slot rights is a crucial question. Only after consumer outrage did the CCI step in the Indigo case.

The concept of "regulatory capture" is a major problem for the introduction of competition remedies in the Indian aviation sector.[2] Critics warn that deferring to such regulators "inordinately" delays or even divests the CCI's jurisdiction. In practice, DGCA slot and crew-rest rules act as quasi-immunities: carriers invoke them as mere planning or safety compliance, effectively sidestepping antitrust review. For example, IndiGo sought to justify the 2025 wave of flight cancellations by invoking a range of operational and external factors- ranging from technical and weather-related disruptions to seasonal scheduling adjustments, system congestion, and constraints stemming from the implementation of the revised Flight Duty Time Limitations (FDTL) Phase II crew-rostering framework. In effect, these capture-driven safe harbours grant incumbents a de facto antitrust immunity, postponing CCI action until the crisis forced a belated intervention. The result is largely reactive enforcement: competition laws bite only after damage is done, bluntly disadvantaging late entrants and entrenching dominant carriers.

EU Slot Regulation and Competition Law: Lessons for India

Europe provides instructive contrasts in regulating airport slot concentration. Regulation (EEC) No. 95/93 (EU Slot Regulation) obliges Member States to ensure that slot allocation at congested airports promotes efficient use of capacity and fair competition, primarily through the use-it-or-lose-it rule, under which airlines retain historical slot rights only if they utilise at least 80% of allocated slots in the previous season. Although the European Union temporarily relaxed this threshold during the COVID-19 pandemic to prevent environmentally wasteful "ghost flights," the 80% requirement continues to apply outside exceptional circumstances. Crucially, EU law prohibits the retention of slots without meaningful operational use; failure to satisfy the usage threshold results in slots being returned to the pool for reallocation, a framework broadly similar to India's DGCA slot-retention regime. However, Europe supplements allocation rules with robust competition-law enforcement. Even Article 10(7) of the Regulation (EEC) No. 95/93 (EU Slot Regulation) reserves 50% slots for the new entrants. In merger control, the European Commission

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routinely imposes structural slot remedies where concentration risks arise at congested airports. In the Lufthansa–ITA Airways merger, for example, Lufthansa was required to divest take-off and landing slots at Milan Linate Airport to rival carriers, including easyJet, to preserve competitive access. Similarly, EU authorities required the release of Heathrow slots in the Delta–Air Lines transatlantic alliance, a remedy subsequently upheld by European courts. Beyond merger control, Article 102 TFEU provides a doctrinal basis for addressing slot hoarding directly. The Commission's 2008 Slot Trading Communication recognises that refusal to lease or surrender slots by a dominant airline may constitute an abuse by denying competitors access to an essential facility, a position supported by academic commentary even though EU courts have not yet ruled squarely on slot hoarding itself.

Importantly, economic literature suggests that slot hoarding is an inevitable consequence of the use-it-or-lose-it rule. Formal modelling of grandfather-rights regimes demonstrates that airlines engage in slot hoarding only when the demand–capacity ratio is sufficiently low, rather than as a structural feature of slot policy. Where hoarding does occur, airlines rationally respond by increasing flight frequency, deploying smaller aircraft, merging passengers of two scheduled flights into one and charging higher fares in order to preserve historic slot rights.

Recent Australian experience underscores the competitive harm caused by weak slot discipline. Investigative reporting on the Sydney–Melbourne route shows that incumbents have retained peak-hour slots despite high cancellation rates sometimes exceeding 10–20%, effectively foreclosing entry while formally complying with slot-usage thresholds. Academic analysis from the University of New South Wales similarly identifies slot hoarding and strategic cancellations as structural barriers to competition in concentrated aviation markets.

In contrast, India lacks comparable competition-driven slot remedies. Thus, this paper argues that an EU-style structural solutions are both legally and institutionally transplantable. Slots are "essential facilities" in any system, as it is a scarce input for providing service. So remedies like slot pools and divestments have the same competition rationale in India as in Europe. The DGCA can more strictly, as a regulator of essential infrastructure, enforce the use-it-or-lose-it and reserve new-entrant slots, for example, formally mandating 50% of freed slots to new entrants, per EU practice. Likewise, the CCI can interpret Section 4 more effect-based,

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consistent with the EU practice, by recognising that long-term denial of slots or route cutbacks by a dominant carrier injures competition. Merger control in the airline sector would benefit from ex ante, route-specific concentration screens, such as market-share and HHI thresholds, particularly at slot-constrained airports.[3] Where such indicators reveal a likelihood of post-merger dominance and foreclosure, the imposition of structural remedies, most notably mandatory slot divestitures, would align Indian practice with the established EU approach.

Concluding Remarks

The CCI cannot cede responsibility for safeguarding competitive access to airports solely to the DGCA. Given the systemic risk posed by slot hoarding and the strategic importance of slots as bottleneck inputs, the CCI must proactively develop or recognise a remedy framework within competition law jurisprudence. This framework should be rooted in essential-facilities reasoning and international best practices to prevent exclusionary conduct.

Central to this approach is the paper's reframing of strategic flight cancellations and slot retention not merely as operational lapses, but as a documented abuse of dominance under competition law. To diminish these barriers, the regulatory regime requires concrete reforms, specifically (i) Cancellation-triggered slot surrender thresholds to penalize non-utilization and (ii) Mandatory coordination between the DGCA and the CCI to ensure that oversight is both technical and competitive.

By establishing a clearer link between competitive slot allocation and market efficiency, these interventions ensure that airport infrastructure serves the broader goal of consumer welfare. Ultimately, a sustainable and contestable aviation sector can only be achieved by treating slots as shared public goods rather than tools for market foreclosure.

Notes and References:

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[1] Globally, Low-Cost Carriers (LCCs) account for approximately 30–35% of total passenger traffic, with a significantly higher share in domestic markets. In India, LCCs collectively account for over 80% of domestic air passenger traffic, reflecting their dominance in price-sensitive aviation markets.

[2] Regulatory capture refers to a condition in which a regulatory authority, rather than acting solely in the public interest, systematically aligns its policies, enforcement priorities, or discretionary decisions with the interests of the industry it regulates, often due to repeated interaction, informational dependence, or shared institutional objectives. In such circumstances, regulation is shaped more by regulated entities.

[3] Structural slot divestiture is a common remedy in airline mergers in jurisdictions where entry is constrained by airport capacity. The European Commission's decisions in Lufthansa/ITA and Air France–KLM are the examples of it.

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